

Washing Machine Hoses: A Disaster Waiting to Happen

Though most property owners are careful to protect their buildings and possessions against fire, burglary, storms, and other dangerous conditions, they often overlook a situation that insurers know to be one of the most potentially destructive and costly: water damage caused by leaking or malfunctioning home appliances, especially washing machines.

Unlikely as it may seem, water damage from washing machines is one of the top five causes of claims to home insurers, according to the Institute for Business and Home Safety, which analyzed 525 washing machine claims from multiple insurance companies. Of all water damage claims related to washing machines, more than half – nearly 55% – are from water supply hoses that leaked or burst. And these claims are costly, with the average claim running to more than \$6,000.

Why and How Do Washing Machine Hoses Fail?

Over time, most washing machine hoses, even those that are installed properly, will eventually fail, leading to leaks or catastrophic floods caused when the hoses burst. Failure may be caused any of several factors, including age, installation error, poor-quality materials, and poor design.

Under normal conditions, water in the hoses is under the same pressure as in other faucets in the building. When the hose becomes weakened, or when the connection is faulty, the water pressure will break the hose or coupling, sending water flooding out. In a typical residential plumbing system, water will spill out of a single burst hose at a rate of about 650 gallons per hour (that's six gallons per minute, or 2½ tons per hour). Because the supply lines to the washing machines are always "on," water will flood from a broken hose until someone notices it and turns off the main supply line. If the hose breaks at night or when a building is unoccupied, thousands of gallons of water might flood the building before the problem is discovered. If the line breaks on a washing machine situated on an upper floor, the damage will be extensive as the water pours through the floors.

Most traditional washing machine hoses are made of reinforced rubber or polymer. (Fig. 1) These materials lose resiliency as they age, making them subject to cracks, leaks, and bursting. The IBHS study showed that failure rates increase dramatically in hoses that are more than five years old; the average age of failed hoses was 8.7 years. More than half of all failures occurred by the time the machine and its hoses were eight years old, and nearly 80% occurred before ten years.



Fig. 1. Standard rubber washing machine hose about to burst.

Photo courtesy Inspections Unlimited. Used with permission.

Improper installation can also damage the hose, leading to premature failure. The most common installation error is failure to leave sufficient room between the machine and the wall connection to prevent kinking or bending of the hose, particularly near the valve connections, as described below. Cracks, crimps, or blockages in the line will cause damage and lead to leaks or total failure.

Poor design (including fabrication from poor-quality materials) is probably the most significant factor in the failure of both kinds of hose commonly in use – the standard black rubber hose and the braided steel variety – though these products usually fail for different reasons, as described below.

Standard black washer hoses are made of rubber tubing with a polyester reinforcement lining. (Fig. 3) The metal inserts at the coupling end are rolled and stamped from thin sheets of copper alloy. Most failures occur at the end of the hose, where the metal insert comes into contact with the tubing. (Fig. 2) Failures generally occur for one of the following reasons:

Razoring — The metal insert has a very sharp edge which is in direct contact with the rubber tube. This edge becomes progressively thinner and sharper as it is worn away by the movements of the water and by the effects of electrolysis. In a process called “razoring,” the motion of the washing machine causes the metal edge to rub repeatedly against the inside of the hose, cutting it gradually from the inside out.

Stress Fractures — The metal insert is attached to the hose by a ferrule, or ring, which is crimped tightly to hold the pieces together. The crimping can cause a stress fracture in the hose, which is then subject to failure, especially as the rubber ages and begins to deteriorate.

Rusting — Corrosion (rusting) of the metal fitting can cause failure in two ways. First, as the thin metal fitting corrodes, it becomes jagged and rough and cuts into the hose as the washing machine operates. Water can leak between the hose and its outer covering, forming a bubble, a critical warning sign of imminent failure. (Fig. 1) Though a bubble may appear anywhere along the line, most breaks occur at the point where the metal fitting meets the rubber tube. Second, as the fitting continues to corrode, it can become so weak that it may eventually break apart.

Braided stainless steel hoses (sometimes called “steel-clad” hoses) were designed as a reliable replacement for standard black hoses, but they, too, have been problematic. They have proven to be not much stronger than standard rubber hoses, and they are also subject to failures related to the materials from which they are fabricated.



Fig. 2. Burst rubber washer hose.

Photo courtesy PMC Plumbing. Used with permission

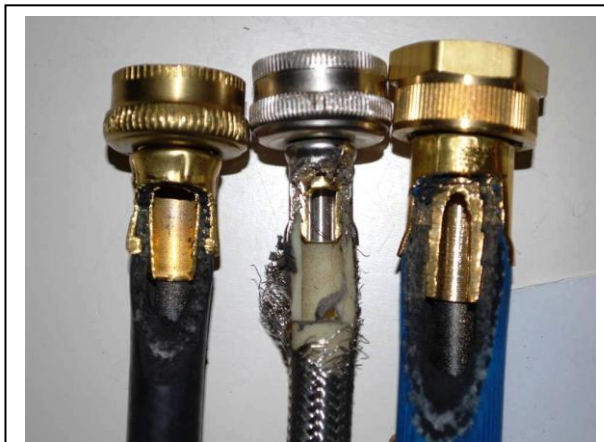


Fig. 3. Left to right: Cross sections of a standard black rubber hose, a plastic hose with braided stainless steel covering, and the Floodchek™ hose.

Photo by SCM Engineering. Used with permission.
Hoses provided by Creative Laundry Systems.

Crimping — A braided stainless steel hose consists of a plastic or rubber tube covered with a braided steel sheath, which is sometimes protected with a thin nylon coating. (Fig. 3) Because of the variety of materials used, a very tight crimp is required to fasten the metal fitting securely to the hose. During the manufacturing process, this tight crimping can damage the hose by cutting into the rubber. Once the product is installed on a washing machine, the action of the water and the movements of the machine can make the cuts worse, leading to eventual failure.

Corrosion — The stainless steel braided cover can oxidize when exposed to chloramine, a chemical increasingly popular in water treatment. Under these conditions, the stainless steel braided cover can weaken, fray, and even break, so that it can no longer provide strength to the hose.

Inspect Washing Machine Hoses Regularly

In many cases, the hoses and fittings that connect the washing machine to the water source are visible and easy to inspect every time the machine is used. If your machine's hoses are not visible, find out how to gain access to them in order to inspect them once a month or so. Inspect both hot and cold water lines. Most failures occur near the connection, where the hose typically bends. Here's what to look for:

- **Signs of Imminent Failure.** Look for obvious signs of deterioration or imminent failure, such as blisters, bulges, bubbles, cracks, unraveling, discoloration, crimps, or kinks, especially near the connections and turns in the hose.
- **Leaks.** Check for moisture, drips, rust, discoloration, or leaks in, on, or around the hoses and connections or in the catch pan (if present). Check the connections to be sure that they are tightened properly, as described below. *Even a small leak may indicate an imminent failure.*
- **Proper Positioning.** Be sure that the washing machine is located at least four inches from the connections (usually at the wall) so that the hose is not bent or kinked. Check to see that the machine is properly balanced so that it does not "walk" during use. The motion of a "walking" machine will place added stress on the hoses and connections.

Replace Defective or Aging Hoses Immediately

All washer hoses, whether reinforced rubber or braided steel, must be installed properly, inspected regularly, and replaced *before* they wear out.

If an inspection reveals any of the danger signs listed above, or if leaks are present, replace the hoses and fittings immediately, as described below. *Do not delay.* Remember that damage and deterioration may exist on the inside of the hose or fitting and may not be visible during an inspection.

The useful service life of a standard black hose or braided steel hose is at most only five to seven years. Even if they do not show obvious signs of deterioration or wear, these hoses should be replaced every three to five years. Replacement hoses and fittings are inexpensive and readily available, and installation is straightforward and easily done with common tools. Be sure to keep a record of when you last changed the hoses; this could be as simple as a card taped to the back of the machine where dates and details can be recorded.

For best results, Sequoia Insurance recommends that all washing machines be fitted with heavy-duty engineered hoses such as Floodchek™ (Fig. 3) rather than with standard black hoses or braided steel hoses.

FLOODCHEK™ WASHING MACHINE HOSES

Sequoia Insurance recommends that all washing machines be fitted with high-quality Floodchek™ hoses that are engineered for durability and reliability. Floodchek hoses are guaranteed for 20 years against failure due to defective design, materials, or workmanship.



The Floodchek hose features a sturdy brass insert that is rounded at the end to prevent its cutting the hose from the inside. And because the brass is thicker, the fitting can withstand crimping along the whole length of the insert, which allows the pressure of the crimp to be distributed over a larger area, thus preventing a single pressure point that can damage the hose. The hose is flared at the fitting end, providing ample space around the end of the insert, which also reduces the risk of damage inside the hose. The Floodchek hose is twice as thick as conventional hoses and is extra sturdy for long wear. The use of better-quality brass discourages electrolysis. According to Floodchek, there has not yet been a single reported failure of Floodchek hose in the tens of thousands of installations done since 1989. More information is at www.floodchek.com.

Install Hoses Properly

- Leave Ample Space for the Hoses. When installing hoses, be sure to leave at least four inches of space between the back of the washing machine and the wall connection. This space is necessary to prevent kinking in the hose near the valve connection, where sharp edges within the hardware can cut into the inside of the hose (“razoring”). Some hoses come with pre-formed metal elbows at the ends to prevent the hoses from bending too tightly.
- Handle Connections with Care. Ensure that the valve connections are securely fastened, but do not over-tighten them, as this may damage the hardware or the hoses. Tighten first by hand, then use water pump pliers to tighten an additional $\frac{2}{3}$ turn. Be sure your rubber washer gasket is in good condition, and use thread tape.
- Consider Installing a Lever Valve. Many homeowners may find it easier to manage a dual ball valve lever-operated water shut-off valve than a traditional screw-type valve (which is also prone to leaking). A lever-operated valve can also be set up to shut off both hot and cold water with a single lever, which will make it easier to turn off the water supply when it is not in use (as advised below) or in an emergency situation.
- Know How and Where to Shut Off the Water Supply. When installing the washing machine, position it so that the water supply control valves will be easily accessible. Know where the building’s main water shutoff valve is located, so that the water may be shut off if the control valves at the machine are inoperable.

Take Other Precautions to Reduce Risk

- Be Attentive. Use the washing machine only when someone is present. The IBHS study confirmed that washer failures that occurred when property owners were away resulted in 150% greater losses.
- Turn Off Water Between Uses. To relieve the potentially damaging water pressure in the hoses, and to minimize damage should the hose fail, turn off the water supply when the washing machine is not in use, especially when the machines will be unattended for any length of time, such as when the building is unoccupied. On most machines, this is easy to do at the control valves behind the washer.
- Install the Washing Machine at the Lowest Possible Level. When possible, install the washing machine on the building’s lowest level to minimize damage should a leak occur. The IBHS reports that leaks from washing machines located on the first floor (as opposed to the basement) resulted in 28% greater losses since the leaking water damaged costly furnishings in living areas.
- Install a Catch Pan Under the Washer. Under the washer, install a catch pan with a drain that is connected to a waste line, sump pump, or other means of removing the water from the building. The catch pan will contain small leaks.
- Add a Leak Sensor and Automatic Shut-Off Valve (ASOV). Strategically-located water sensors can detect the presence of water in places that should be dry (such as on the floor beneath the washer). When a leak or overflow activates the sensor, the shut-off valve closes automatically to stop the flow of additional water into the system.
- Add a Water Flow Sensor. A flow sensor, installed in the main water line, sounds an alarm when water flow during a given time exceeds the normal flow programmed for that time.

The best and easiest way to prevent failures of washing machine hoses is to inspect them regularly and replace them *before* they show any signs of aging, deterioration, or failure.

Unless indicated otherwise, the use of photographs or information from manufacturers or suppliers does not imply endorsement of those products, or of their manufacturers or suppliers, by Sequoia Insurance Company.